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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/784,016	02/20/2004	Bruno Ghyselen	4717-10000	2494
28765	7590	08/10/2005	EXAMINER	
WINSTON & STRAWN LLP			TRAN, THIEN F	
1700 K STREET, N.W.			ART UNIT	
WASHINGTON, DC 20006			PAPER NUMBER	
			2811	

DATE MAILED: 08/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/784,016	GHYSELEN ET AL.	
	Examiner	Art Unit	
	Thien F. Tran	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24, 27 and 28 is/are pending in the application.
- 4a) Of the above claim(s) 2 and 3 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 27 and 28 is/are allowed.
- 6) ☒ Claim(s) 1, 7-19, 23 and 24 is/are rejected.
- 7) ☒ Claim(s) 4-6 and 20-22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8, 10-11, 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitation "the receiving substrate" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 10 recites the limitation "the receiving substrate" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 19 recites the limitation "the Si material layer" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 7-8, 10-13, 15-18 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Hobart et al. (Reference AN).

Hobart et al. disclose a method of forming a substrate that includes a relaxed layer on a substrate comprising growing an elastically stressed layer of SiGe on a host wafer as a donor substrate; forming a glassy layer (BPSG or SiO₂) on the stressed layer; removing step using the same Smart-Cut technique as described in page 14 of the application to separate the a portion of the donor substrate (host wafer) to form the Si/SiGe/Si/Oxide stack structure that includes the glassy layer oxide, the stressed layer SiGe and a surface layer (thin Si cap); and heat treating the structure at a temperature of at least a viscosity temperature of the glassy layer to relax the stressed layer.

Regarding claim 7, Hobart et al. disclose a donor SOI substrate comprising a Si layer on an insulating layer, and SiGe and Si epitaxial layers formed on the SOI substrate. The formation of SiGe and Si epitaxial layers on SOI substrate inherently involves inducing crystal growth on the SOI structure using Si as a semiconductor material.

Regarding claim 8, the glassy layer is formed on a handle wafer as a receiving substrate, and wherein, before bonding, a thin 4nm Si layer is formed on the stressed layer SiGe having a thickness that is less than that of the stressed layer (30 nm thick).

Regarding claims 10 and 11, the receiving substrate (handle wafer) is a SOI substrate. A SOI substrate is known to comprise a silicon layer on an insulating silicon oxide layer on a base silicon substrate (Si/SiO₂/Si stack structure). This SiO₂ layer as a part of the SOI substrate is considered as a bonding layer.

Regarding claims 12 and 13, Hobart et al. teach the same Smart-Cut technique that uses in the present invention. As such, Hobart et al. also teach the limitation recited in claims 12 and 13.

Regarding claim 15, the removing step comprises selective chemical etching.

Regarding claims 16 and 17, the glassy layer (BPSG or SiO_2) is an electrically insulating material.

Regarding claim 18, the donor substrate (SOI host wafer) is Si, and the stressed layer is $\text{Si}_{1-x}\text{Ge}_x$.

Regarding claim 23, the glassy layer (BPSG or SiO_2) is an electrically insulating material and the structure is a semiconductor-on-insulator structure (SOI).

Claims 1, 7, 9-12, 14-19 and 24 are rejected under 35 U.S.C. 102(a) as being anticipated by Notsu et al. (EP 1 248 294 A2).

Notsu et al. disclose a method of forming a substrate that includes a relaxed layer on a substrate comprising growing an elastically stressed layer of SiGe 14 on a donor substrate (Figure 1A); forming a glassy layer 21 of a viscous material on the stressed layer (Figure 1B); removing a portion of the donor substrate (Figure 1D) to form a structure that includes the glassy layer 21, the stressed layer 14 and a surface layer 13'; and heat treating the structure at a temperature of at least a viscosity temperature of the glassy layer that inherently relaxes the stressed layer (paragraphs 0054, 0059 and 0060).

Regarding claim 7, Notsu et al. also teach inducing crystal growth on the structure using a semiconductor material

Regarding claim 9, the glassy layer 21 comprises a semiconductor material layer 15 that is grown on the stressed layer 14 and which further comprises completing a controlled treatment that transforms at least a portion of the semiconductor material 15 layer into a viscous material 21 at a viscosity temperature by thermal oxidation process.

Regarding claim 10, Notsu et al. also disclose a bonding layer 32 on a receiving substrate 30 prior to bonding the glassy layer 21 thereon (Figure 1C).

Regarding claim 11, the bonding layer 32 is an SiO₂ material.

Regarding claim 12, Notsu et al. also teach forming a weakened zone 12 in the donor substrate 10' for removal by detachment wherein the weakened zone is formed at a depth value that is close to the thickness of the surface layer 13.

Regarding claim 14, the donor substrate 10' is formed by forming a porous layer 12 on a crystalline backing substrate 11, and growing a crystal layer 13 on the porous layer, wherein the porous layer forms a weakened area in the donor substrate.

Regarding claim 15, the removing step comprises selective chemical etching (paragraph 0058).

Regarding claims 16 and 17, the glassy layer 21 comprises SiO₂ which is an electrically insulating material.

Regarding claim 18, the donor substrate 10' is Si, and the stressed layer is SiGe.

Regarding claim 19, the glassy layer 21 is a material 15 grown on the stressed layer 14, and which further comprises completing a controlled thermal oxidation for

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transforming at least a portion of a Si material layer 15 into SiO₂ to form a SiO₂ glassy layer.

Regarding claim 24, Notsu et al. further teach preparing components from at least one of the stressed layer or an epitaxial layer.

Allowable Subject Matter

Claims 27 and 28 are allowed.

Claims 4-6 and 20-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: prior art references do not teach or render obvious a method of forming a structure that includes a relaxed layer on a substrate comprising the step of using a controlled treatment that includes heat treating to a second viscosity temperature to transform at least a portion of the surface layer into a second glassy layer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thien F. Tran whose telephone number is (571) 272-1665. The examiner can normally be reached on 8:30AM - 5:00PM Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

tt

August 7, 2005


THIEN TRAN
PRIMARY EXAMINER